

Lancashire Wildlife Trust

Invest in Arup Research

A natural capital-led evaluation of The Mosslands

Issue | August 2016



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The Mosslands

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It is not intended for and should not be relied upon by any third party and no responsibility is undertaken to any third party.

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1 Context

1.1 Aim and background

This research project has been funded by Arup’s Internal Investment fund. The purpose and aim of the project is to take recent thinking around natural capital and ecosystem services, and apply it to a local site, working with a local partner where possible. Discussions with the Lancashire Wildlife Trust led to the Chat Moss and the Mosslands area being selected for analysis. This was due to current or planned projects in the area, public perceptions of the area and the potential for it to become a significant environmental/social asset for Greater Manchester.

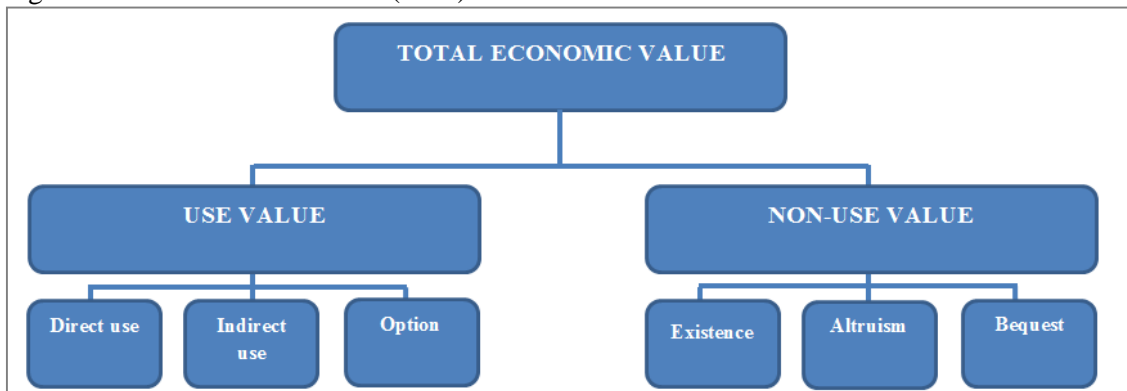
The research takes an ecosystem service-led approach to analyse the existing socio-economic benefits which flow from the existing environmental “asset”, and what the change might be in the future. This derives an anthropocentric (human-focussed) view of the given environment and is a useful starting point for structuring further debate, facilitating discussions and analysing trade-offs between the many benefits arising from the Mosslands area.

It is hoped that the analysis, which seeks to draw logical links between society, economy and environment, will be useful in facilitating discussion around value and trade-offs, and future management options.

1.2 Total Economic Value (TEV)

The key starting point in this research is the TEV framework. This can be applied to any environmental “asset” (a term used throughout to describe an environment), or indeed a man-made asset which has value beyond the typical commercial definitions. Using the TEV framework allows assessors to avoid partial valuation. In the TEV framework values are broken down into two components; use and non-use values, and within these there are a number of other sub-sets (Figure 1).

Figure 1: Total Economic Value (TEV) framework



For use values these subsets include direct use, indirect use and option values. For non-use values the subsets are more conceptual, including the value from knowing an asset exists, the value of knowing others might benefit from an asset today

(altruism) and the value of knowing that future generations will derive future benefit (bequest).

A TEV-led approach will be used in this appraisal. By using ecosystem service and natural capital concepts, the TEV of the site will be estimated.

1.3 Terminology

It is widely acknowledged that there is a language problem in the field of natural capital. Many people find the concepts difficult, and the vocabulary used to describe the concepts does not always help. The terms natural capital and ecosystem services are the first stumbling blocks.

Capital, in economics, is a general term used to describe (often man-made) assets used in production, to create value. Equally, “capital” may be seen as a stock of assets, such as a premises and all the machines within it. Capital assets produce very specific services for their owners.

Natural Capital is an extension of the above definition. In using this term, one automatically views the environment¹ as a stock of assets, which produce value for society, individuals or organisations. The Defra website cites the Natural Capital Committee’s definition:

*“Natural Capital refers to the elements of nature that produce value (directly and indirectly) to people, such as the **stock** of forests, rivers, land, minerals and oceans”. It includes the living aspects of nature (such as fish stocks) as well as the non-living aspects (such as minerals and energy resources). Natural Capital underpins all other types of capital (man-made, human and social) and is the foundation on which our economy, society and prosperity is built. **By combining different forms of capital, we are able to enjoy a huge variety of benefits; ranging from the food we eat and water we consume in our homes to outdoor experiences and improved health to name but a few.**”²*

Ecosystem services are usually defined as benefits people obtain from ecosystems. Water ecosystems provide, for example, water for drinking or nutrition in the form of fish. They also provide functions that clean the air, provide nutrients to grow food and break down pollutants. Ecosystem services (ES) are typically classified into the following categories:

- Provisioning (e.g. drinking water and fish)
- Regulatory/maintenance: (e.g. flood risk protection and pollution filtration)
- Cultural (e.g. bathing, water sports and bird watching).
- Supporting/underpinning (e.g. nutrient recycling, primary production and soil formation)

The values investigated in ES assessments concern those that flow from environmental “assets”, to humans and/or society, in a given area. Applying this

¹ Environment here can be anything such as a field, a national park, a river catchment, a lake, a city park, private gardens.

² Taken from; <http://www.defra.gov.uk/naturalcapitalcommittee/natural-capital/what-is-natural-capital-2/>

way of thinking to projects can often yield benefits to stakeholders that are not always considered in traditional economic/commercial assessments.

ES assessment literature typically recommends a framework approach. Frameworks allow assessors to work through all the potential ES an environmental resource might offer to help systematically understand and conclude which services are most relevant.

1.4 Financial return and privatisation

Valuation studies are often thought of as the starting point for privatisation, or intrinsically favouring economic benefits for businesses. This is incorrect. Any quantitative values used in analysis provide a means for describing social welfare. In economics, the term welfare relates to concepts such as well-being. Ordinarily, values are aggregated across a population to describe welfare from an environmental asset. Quantitative valuation does not describe a financial return to a person or a group of people; equally, it is not a price tag on an environmental asset (a criticism which is so often levelled at this type of analysis).

1.5 Intrinsic value

The TEV approach (and the Ecosystem Services approach applied throughout this document) does not take into account the intrinsic value of nature, or nature's value in its own right. This can be highly subjective to certain policy aims and objectives, and is disputed by certain stakeholders. Ultimately, the point of discussion is value, and value is a human construct, which is analysed from a human perspective.

This does not imply that the intrinsic value of an area should be discounted from analysis. This concept is discussed further in the conclusions of this report.

2 Approach

2.1 Ecosystem services on sites

As set out previously, an environment can be viewed as a natural capital “asset” from which ES flow to society which result in benefits and contribute to human wellbeing (made up of health, the economy, security or shared social values).

The values investigated in ES assessments concern those that flow from environmental assets, to humans and/or society, in a given area. Applying this way of thinking can often yield consideration of costs, benefits and dependencies to stakeholders that are not always considered in traditional economic and/or commercial assessments of a project or plan.

More theory and background research is included in Appendix A of this document.

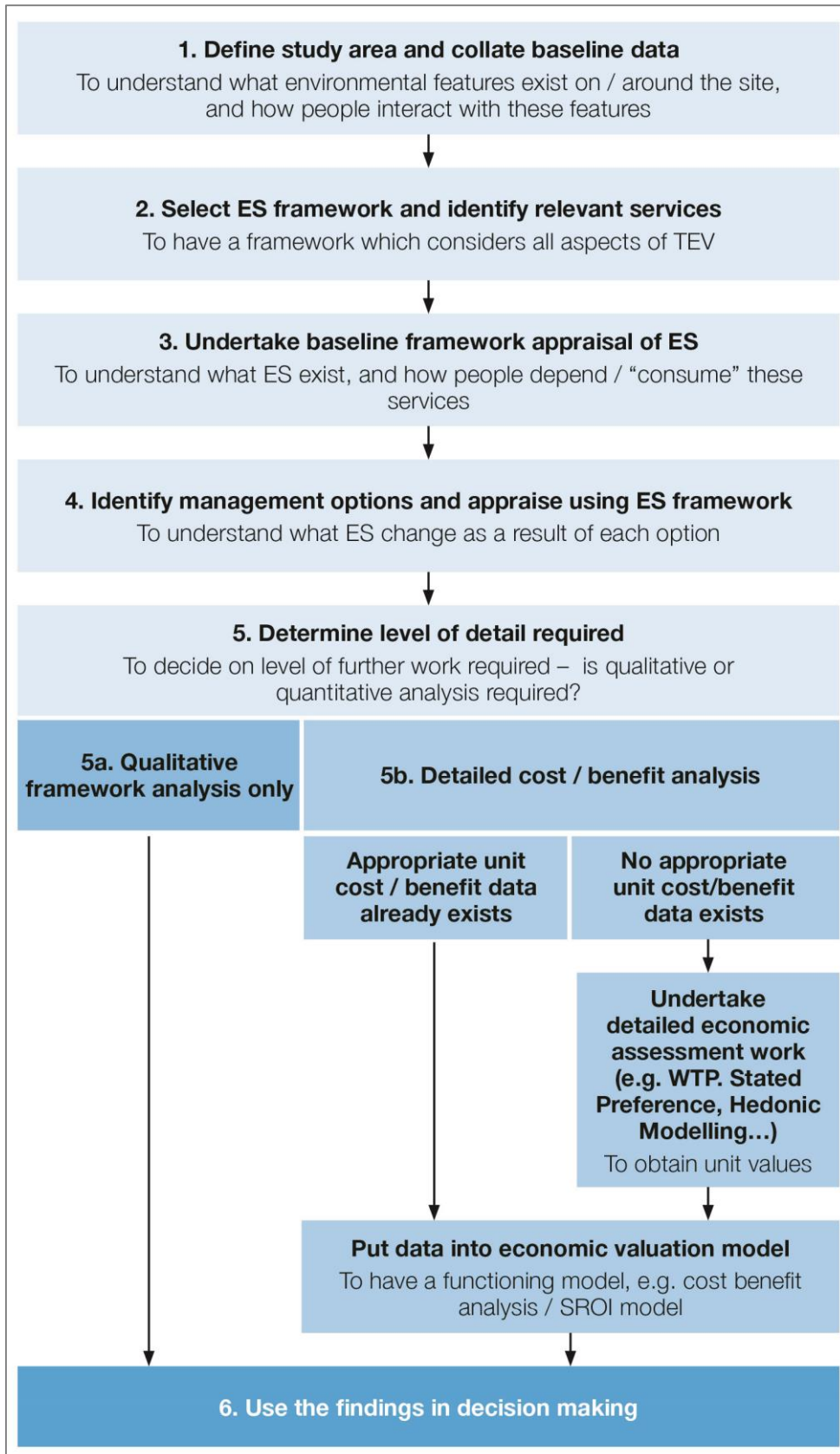
2.2 Appraisal overview

Arup has developed an approach for assessing ecosystem services on a site. The approach begins with extensive research on the site, which draws out key stakeholders (or stakeholder groups) and defines how they interact with the site through ecosystem services. Assuming management options are available for testing, the approach then examines how the provision of ecosystem services change.

The approach then includes numerical analysis and monetisation, where data is available. The approach is broken down into six stages, illustrated in Figure 2 and summarised below:

1. Define the area for the analysis, and gather baseline environmental and socio-economic data.
2. Draw up an ES framework (in this work we have used the Corporate Ecosystem Service Valuation (CEV) framework).
3. Complete the framework, qualitatively, to illustrate the baseline ES, and identify those affected.
4. Qualitatively appraise the change in ES from the identified management/policy options.
5. Carry out numerical analysis (if necessary/appropriate).
6. Use in decision making, as appropriate.

Figure 2: ES appraisal flow chart



3 The environmental and socio-economic baseline

3.1 Introduction

This study focusses on the characteristics of the area known as the Mosslands (and its surroundings). The area covers approximately 30% of Salford (2,750 hectares) and contains the largest area of grade 1 and 2 farmland, and the largest woodland in Greater Manchester. It is also a source of significant wildlife interest such as farmland birds and remnants of lowland bog habitat which is a rare and declining habitat which can only be found on lowland peat.

Chat Moss is an area within the Mosslands owned by Peel Environmental Limited. It has recently been in active use for peat extraction with the latest planning permission running out at the end of 2010. The former peat extraction area covers an area of around 65 hectares. There is a broad belt of land to the east of the site where peat extraction ceased a number of years ago and has been restored for nature conservation purposes.

The potential of Chat Moss as a major green lung for the city is recognised. Chat Moss has the potential to be a productive landscape with long term recreational, environmental, economic and health benefits for the city, but this will require partnership working and a proactive approach.

3.2 The location

The Chat Moss site and the surrounding Mosslands area itself has a relatively low population, based, as it is, on agriculture and related activities. However it sits close to Irlam and Cadishead which together have a population of over 20,000 and is located within a relatively short distance of Salford and Manchester with far larger populations.

The area surrounding the Mosslands has a high population density, despite including considerable areas of open space (see Appendix B, Figure 11). This reflects the number of highly populated settlements in and around the area. This represents a population which could potentially use the site for recreational purposes. The local population is also expected to grow significantly in the near future (see Appendix B, Figure 12).

The mean income level for Salford is generally lower than in the wider Greater Manchester and North West regions, and all three are lower than the average full time income across England. The Indices of Multiple Deprivation (IMD)³ examine many contributing factors to deprivation and weights them into one index. Generally, the Mossland is in an area of high deprivation.

³ A multivariate indicator set produced by government to aid and inform awareness of deprivation and approached to improving the conditions in deprived areas

The Living Environment domain combines 4 indicators to give an overall score for the level of deprivation in the quality of the local environment⁴. This shows similar patterns to the IMD Figure 18 in Appendix B in the “health and disability” deprivation domain. This includes data for early deaths, comparative rates of illness, morbidity and mood/anxiety disorders. Health and disability is clearly identified as a significant issue in the area, with more areas of red (i.e. more deprived) across the wider area, even in those which are not considered more deprived in the above figures.

3.3 The environment

The Chat Moss area or Chat Moss “estate” as it used to be known, is dominated by a rectangular grid of roads which used to be tramways bringing in night soil from Manchester, which doubled up as fertiliser for the agricultural areas. The other major feature is the Liverpool to Manchester railway built in 1832 which runs east - west through the centre of the Mosslands area.

In order to make the area viable for farming, it was necessary to drain the peat, so it is also characterised by very deep ditches often running alongside the roads. Despite these efforts to dry out the peat, some areas were never farmed, probably because they contained the greatest depths of peat, and were always too wet to farm. These are the areas which were subsequently subjected to peat extraction and are the areas that are now relic lowland raised bogs surrounded by a mosaic of agricultural land.

The ditch system makes it very difficult to identify water flows in detail but nonetheless the drainage is generally from east to west, flowing down to the River Glaze.

It is therefore the peat that is the common factor for nearly all the stakeholders:

- For farmers, and turf cutters it is the basis of the soil that they cultivate,
- For peat extractors it is a raw material to be removed,
- For those with an interest in wildlife it is the basis of the Mossland habitats.
- For others it is the basis of the Mossland landscape which they want to walk in, or otherwise enjoy, or use as an educational or recreational resource.

Finally of course, there is the benefit to the global community of preservation of the stored carbon and subsequent ongoing sequestration after restoration.

⁴ The indicators used in the latest update of this domain are; - Social and private housing in poor condition - Houses without central heating - Air quality - Road traffic accidents involving injury to pedestrians and cyclists

3.4 Industries

There is a growing interest in the future landscapes of the Mosslands, and in Salford there is a recognition that many of the activities on the moss are resulting in a fragmented landscape with few tangible benefits to the local economy.

Chat Moss is owned by Peel Environmental Ltd, and has been leased out to horticultural companies during the last 40 or so years, during the time the site has been subject to peat extraction. William Sinclair Horticulture (WSH) took over this lease in 2008. In 2010, WSH applied for an additional 15 year permission to extract peat from about 50 hectares of the site, which was turned down after a Public Inquiry in 2012.

Much of the landscape of Chat Moss reflects its agricultural past. It was reclaimed in the 19th century by a large-scale network of drainage channels. These are still required today to prevent the land getting waterlogged and they have resulted in a patchwork landscape with fields often separated by ditches rather than hedges or walls.

Chat Moss was once one of the major sources of crop production for Manchester, supplying the salad and vegetable needs of the city. It was an important source of employment and income for local people. However, over time, this farm economy has declined

The largest current industry in the area is still farming, but as farming has declined, the last decade or so has seen an increase in activities such as “horsiculture” and turf cutting.

There is still a relatively small amount of peat extraction at neighbouring sites but this is coming to an end. At Little Woolden Moss the lease which currently allows peat extraction will terminate at the end of 2017, and peat extraction at Astley Moss East (to the north of Chat Moss) will cease at the end of 2015.

On the same Astley Moss East site, sand and gravel extraction takes place (Breedons). A planning application is expected imminently to allow an extension of sand and gravel extraction working.

3.5 Recreation and leisure

Recreational uses are on the increase. Moss Farm Fisheries just to the south of the Chat Moss former peat extraction site consists of a series of lagoons dug into the peat which are now being used for recreational fishing. This is supported by a cafe and the local management encourage people to come in and visit the Mosslands.

Historically, the local community felt somewhat inhibited from accessing the Mosslands because they were essentially an industrial area and public rights of way, where they existed, were very poorly signed if at all. This is now changing with community initiatives led by groups such as the Hamilton Davies Trust in Cadishead which aims to encourage access and to establish walking and cycling trails. This coincides with projects such as the HLF funded Chat Moss project and the Carbon Landscape project (in development) both of which have substantial community elements and which aim to “reconnect” the community

with its natural heritage. It is fair to say however that these projects are relatively recent and at an early stage in development.

Other recreational uses that have flourished for rather longer include birdwatching. Birders tend to be rather less inhibited than the rest of the community and are more confident in asserting their rights. As the quality of local wildlife sites has improved, so has the interest in birdwatching activities and it is likely that this trend will continue.

3.6 Transition towards a “community asset”

The area of study is one which is very much in transition from one era of use (its industrial past) to another – hopefully an area that can thrive based on its value to the community for essentially recreational use, where other uses play a diminishing role.

The LWT vision for this area is one where instead of being a “hidden” area which, despite its close proximity to urban areas, is very little known or used, is transformed into a major community asset which will draw in visitors from much further afield because of the value of the wildlife that it supports.

This does not preclude other alternatives to agriculture such as paludiculture (cultivation of marshland, often for biomass) which would generate an income from the types of habitat that LWT is promoting. This transition might, therefore, include the growth of new commercial ventures.

4 Total Economic Value

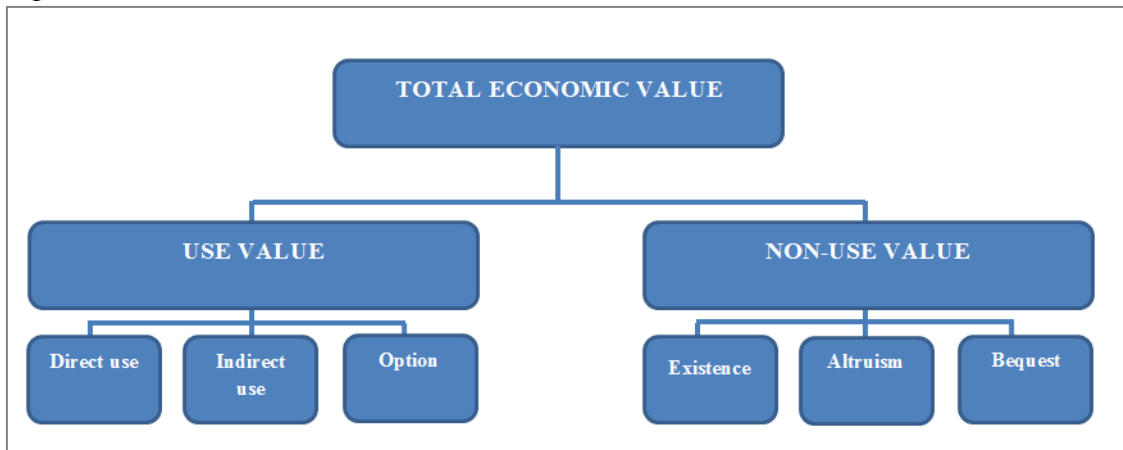
4.1 Introduction

For the next stage of appraisal, an overview of the Mosslands is presented, attempting to describe and quantify its Total Economic Value.

4.2 TEV Framework

Using the findings of the research outlined in the previous section, a qualitative appraisal has taken place to describe the value of the Mosslands using the TEV framework, shown below.

Figure 3: Total Economic Value (TEV) framework



The purpose of this exercise, and the following ecosystem services assessment, is to isolate the benefits which come from the site, so that they can be examined individually, understood and can begin to be aggregated in future assessments.

4.3 Use values

Use values relate to the social and economic benefits obtained from direct use of site. These may include direct consumption of extracted resources (e.g. food and raw materials), direct utilisation of a site (e.g. recreation) and/or indirect use through local air quality regulation or erosion prevention, services with social and economic consequences/benefits, provided by the area but with no market value.

Table 1: Use values

Value....		For	Details
...type	...from		
Direct use	Peat extraction	Private business	<ul style="list-style-type: none"> Resource has been depleted but still has value Peat is not generally considered as renewable, so once consumed, it cannot be consumed again by future generations.
	Agricultural use (commercial)	Private business	<ul style="list-style-type: none"> 80% of the Mosslands project vision area is agriculture Crops were once sold into Manchester wholesale market and further afield, now limited to “a small number of growers”. Now: cropping, turf, potatoes some limited horticulture.
	Agricultural use (hobby farming)	Visitors / locals	<ul style="list-style-type: none"> Increase of “hobby farming”
	Biomass	Private business	<ul style="list-style-type: none"> Firewood Paludiculture (land management techniques that cultivate biomass from wet and rewetted peatlands)
	Recreational use of the site	Visitors #1: local residents Visitors #2: from outside the local area	<ul style="list-style-type: none"> 5% of the Mosslands project vision area is used for “public enjoyment and recreation”. 5% is nature conservation designations. Some areas have “health walks” and public footpaths enabling access to nature reserves, woodland etc. Nature reserves – Risley Moss Local nature reserve has 40-50,000 visitors per year (school groups, runs and “a series of events”). Museum at former Astley Green Colliery and Barton Aerodrome. Bridgwater canal – first commercial waterway (Scheduled Ancient Monument). Equestrian.
Indirect use:	Sense of place / History / cultural	Local population, diminishing over distance	<ul style="list-style-type: none"> Residents benefit Industrial legacy Stephenson railway Astley Green Colliery and Barton Aerodrome
	Air quality regulation	Local population and industrial sources	<ul style="list-style-type: none"> 8% of the Mosslands project vision area is woodland. Other areas will remove pollutants Local sources of emission include M62, M60 Industrial beneficiaries
	Carbon sequestration	Global population	<ul style="list-style-type: none"> Carbon taken from the atmosphere through natural processes has a positive impact through climate change mitigation Carbon stored in peat does not contribute to climate change
	Flood protection	Local population Private business	<ul style="list-style-type: none"> There is a network of 100km of artificially cut ditches, these provide flood alleviation EA mapping shows low flood risk throughout the area

Value....		For	Details
...type	...from		
Option value	Value of future use	All of the above	<ul style="list-style-type: none"> This will be relevant to a number of different stakeholders, depending on how they view the site. It is the value of knowing one can “consume” the goods and services the site has to offer in the future.

4.4 Non-use values

The non-use value the site provides are more conceptual in nature

Table 2: Non-use values

Existence	<p>Value without actual use</p> <p>This type of value accrues to those who know about the site, but do not take advantage or “use” the site in any way. Existence value may relate to:</p> <ul style="list-style-type: none"> a historic connection to the site (e.g. someone who grew up near the site, but no longer lives nearby) a general interest in the area but has no intention to visit (i.e. “directly use”) the site (e.g. someone who has an interest in the industrial legacy; Stephenson railway, Astley Green Colliery and Barton Aerodrome). <p>The stakeholders this affects could be drawn from a wide range of the local and wider population. They would suffer a disbenefit if the site Mosslands ceased to exist.</p>
Altruism	<p>This type of value accrues to those who gain value from knowing others benefit from the site. Value may be attached to the fact that other people of the present generation have access to the benefits provided by the Mosslands.</p>
Bequest	<p>Value from knowing future generations will benefit from the site and the unique “services” it provides.</p>

4.5 Identify and quantify stakeholders

The baseline assessment, and the TEV appraisal has shown that there are many ways in which the area creates value for different stakeholders. These stakeholders can be grouped as follows:

- Agricultural and extraction business
- Recreational users
- Moss farm fishery / cafe
- Nearby residents and wider Salford
- Schools
- Global community.

Table 3 below lists the groups, and attempts to quantify the individual sets of stakeholders.

Table 3: Stakeholders, full list and quantity values

Group	No.	Stakeholder	Quantity
Agricultural and extraction business	1	Agricultural business (arable and silage livestock)	Approximately 18 nr. agriculture business. Information from LWT states: 11 arable and silage and 3 livestock south of railway; approximately 4 agriculture business north of the railway.
	2	Woodland/turf business	1 x turf business 5 x woodland
	3	“Horsiculture” business	8 businesses
	4	Peat, sand and gravel extraction business	1 business, supporting 11 jobs ⁵
Recreational users	5	Recreational users <ul style="list-style-type: none"> Walkers / cyclists / horse riders birders fishers hobby farmers. 	50,000. Estimate based on Risely Moss visitors given in the Mosslands Vision document (upper estimate for RM site, likely an underestimate for wider Mosslands) Note: 5% of 2,750 hectares is given over to “public enjoyment and recreation” 5% is given over to “nature conservation”. 275 hectares.
Non-agricultural business	6	Moss Farm fishery and café and New Moss Road Garden Centre	1 fishery business of 6 lakes + café. Café visitor numbers: <ul style="list-style-type: none"> Winter: 170 people a week Summer: 210 people per week [c. 10,000 visitors per annum] 1 x Garden Centre
Nearby residents and wider Salford	7	Nearby Residents: Irlam	18,504
		Cadishead	10,264
		Partington	7,912
		Lymm	12,350
		Astley	11,654
		Tyldesley	14,431
		Culcheth	11,454
	Glazebrook	1,884	
8	Residents from wider Salford	233,933	
Schools	9	Local schools (primary)	982 ⁶
Global community	10	“Global community”	One (note: 8% of the Mosslands project vision area is woodland. 80% is farmland. 5% is nature conservation.

⁵ Source <http://www.bbc.co.uk/news/uk-england-manchester-13237389>

⁶ 5,896 pupils in total, assume only one of the six years takes a trip per year, based on local primary schools

5 Natural capital and ecosystem services

5.1 Natural capital assets

The Mosslands is a “bank” of natural capital stocks/assets from which specific ecosystem services flow. There is the value of the stored carbon, and the social cost associated with keeping it in the ground. Equally, there are peat stocks, which have value now and in the future. Benefits also flow from a number of other natural capital stocks present across the Mosslands area and Chat Moss. Specifically:

- The atmosphere
- Living things and habitats
- Renewable resources
- Non-renewable resource
- Soil
- Water.

Recent approaches to natural capital conservation advocate a “the aggregate natural capital” rule, which seeks to quantify the stocks of natural capital, to measure their provision and ensure that future generations receive at least as much natural capital as the present generation. This is returned to in the final section of this report.

5.2 Greater Manchester’s priority ecosystem services

In December 2014 the Greater Manchester Combined Authority (GMCA) and England commissioned the *Greater Manchester Ecosystem Services Pinch Points* study to look at identifying:

- Priority ecosystem services for Greater Manchester, and their locations
- Pinch points: “issues which are critical to the delivering the priority ESs”
- Key interventions required.

Eight priority ecosystem services were identified, these are shown in table 4 below.

Table 4: Priority ecosystem services across Greater Manchester

Priority services identified by	ES Classification	Applicable for Chat Moss?
Local and commercial food production	Provisioning	Yes - a number of agricultural businesses exist across Chat Moss
Surface water and fluvial flood management	Regulating	Partially – no areas of flood risk exist across the site, but the site may affect flood risk in nearby areas
Carbon storage and sequestration	Regulating	Yes – peat stores carbon, other land use will sequester carbon
Cooling of Urban Heat Island	Regulating	No – site is not built up and does not suffer from the effects of urban heat island
Water quality management	Regulating	Yes - potential water cycling services across the site
Habitat and Wildlife corridor provision	n/a ⁷	Yes - linked to intrinsic value of site.
Public recreation and venue for green travel routes	Cultural	Yes - existing and future potential recreational use
Visual and aesthetic impacts.	Cultural	Yes - historic site with natural and cultural heritage value

The assessment concludes that most of the above services are compatible/complementary. There is some tension between local and commercial food production and some other priority ecosystem services, particularly if food production was to increase in the future. Other messages which are relevant for this study include:

- Need to improve the function of local markets in supplying food from GM to GM (requires a shift from ‘horsiculture’ to food production).
- Need to maximise the flood management (especially in Flood zone 3).
- Need to increase retrofitting of green infrastructure / landform to provide water storage/infiltration.
- Need to preserve and enhance our existing peat.
- If peat rewetting is not feasible, consider closed land cover (grazing/woodland) to reduce oxidisation.
- Appropriately managing our non-peat soils, including maintaining/increasing tree cover and active woodland management; could make a significant contribution to the GM carbon balance.

⁷ No direct service. There is an intrinsic value. May be linked to other final services such as cultural services.

- Sensitively manage our Mosslands to maximise the major positive impacts on water quality (esp. Sediments and dissolved carbon).
- GI retrofitting will be important in tackling diffuse urban pollution.
- Work with private and public landowners to reverse declines in habitat.
- Manage, and take opportunities to connect up, our ecological networks.
- Increase the cross linkages and flexibility of our already extensive existing network of green recreational/active travel routes, including river valleys, canals and National Cycle Network.

5.3 Which Ecosystem Services are provided across the Mosslands ?

This section starts by taking the findings of the baseline work in Sections 3 and 4, to set out a baseline ES framework. The purpose is to draw out those ES which are *material* for the Mosslands area i.e. those which are deemed significant or relevant. The baseline ES framework, shown overleaf is an illustrative representation of the ES provision across the Mosslands.

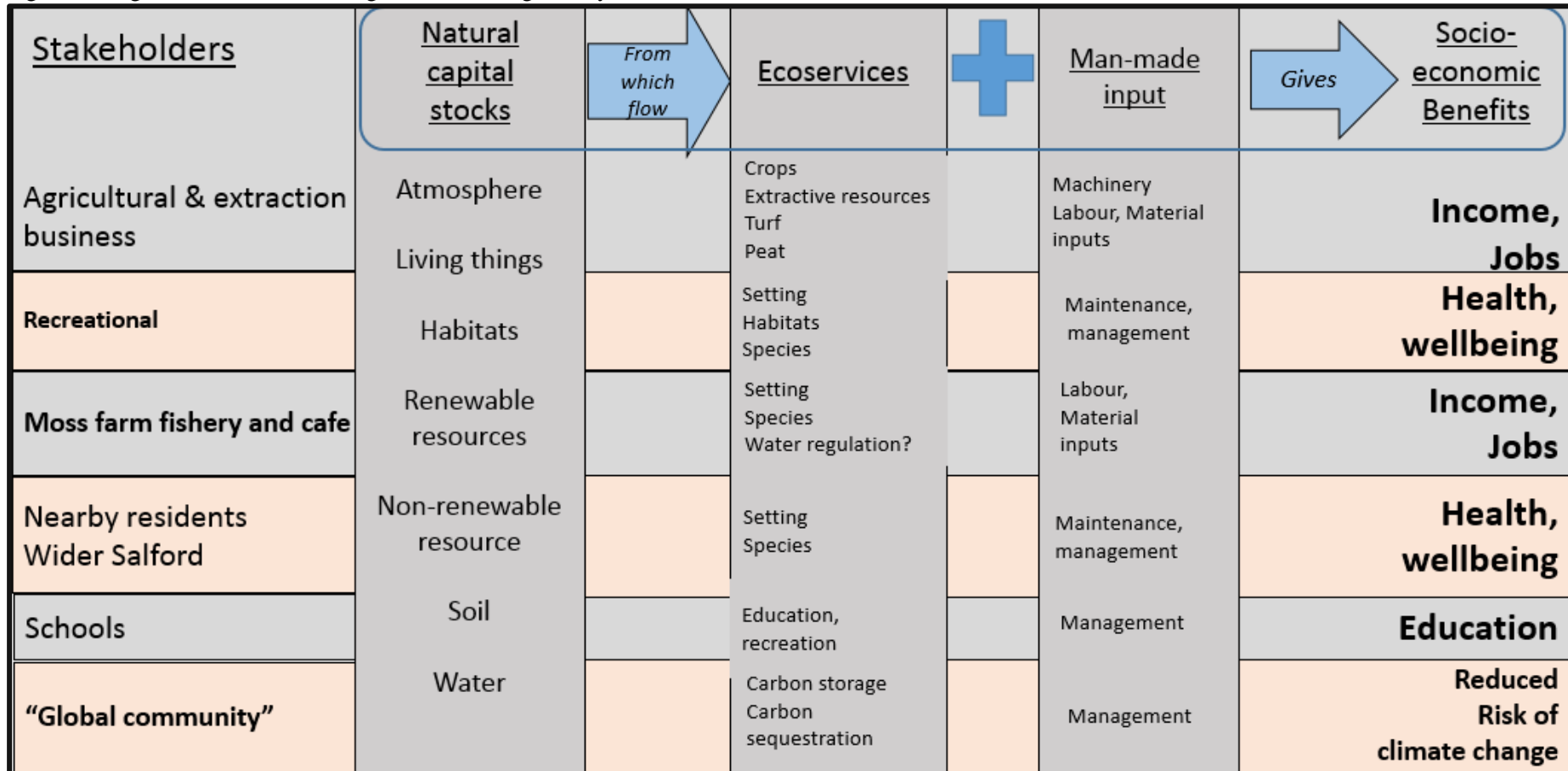
The framework is the starting point in assessing the impact of changes from future projects or investments. The services identified flow from natural capital stocks across the Mosslands, and combine with other inputs to give socio-economic benefit. In summary:



Figure 4: An ecosystem services framework showing which ecosystem services are provided to which stakeholder

PROVISIONING SERVICES		Crops	Livestock	Capture Fisheries	Aquaculture	Wild foods	Turf / wood / other	Timber / fibres/ resins	Animal Skins	Animal resource	Sand and other resources	Ornamental	Biomass	Freshwater
1	Agricultural business (arable and silage livestock)	+	+	0	0	0	0	0	0	0	0	0	0	0
2	Woodland / turf cutting business	0	0	0	0	0	+	0	0	0	0	0	+	0
3	"Horsiculture" business	0	0	0	0	0	0	0	0	0	0	0	0	0
4	Peat, sand, gravel extraction	0	0	0	0	0	0	0	0	+	0	0	0	0
5	Recreational users (walkers, birders, fishers, hobby farmers)	+	0	0	+	+	0	0	0	0	0	0	0	0
6	Moss farm fishery and café	0	0	0	+	0	0	0	0	0	0	0	0	+
7	Nearby Residents (not recreational users)	0	0	0	0	0	0	0	0	0	0	0	0	0
8	Residents from wider area	0	0	0	0	0	0	0	0	0	0	0	0	0
9	Local Schools (focus on primary)	0	0	0	0	0	0	0	0	0	0	0	0	0
10	"Global community"	0	0	0	0	0	0	0	0	0	0	0	0	0
REGULATING SERVICES		Air quality	Global reg. climate	Regional/local reg. climate	Regional/local timing/flow	Reg. of water	Erosion control	Waste treatment	Water purif.	Disease mitigation	Quality of soil	Maint. of mitigation	Pollination	Natural hazard mitig.
1	Agricultural business (arable and silage livestock)	0	0	+	+	0	+	+	+	+	+	+	0	0
2	Woodland / turf cutting business	0	0	0	+	0	0	0	0	0	0	0	0	0
3	"Horsiculture" business	0	0	0	0	0	0	0	0	0	0	0	0	0
4	Peat, sand, gravel extraction	0	0	0	0	0	0	0	0	0	0	0	0	0
5	Recreational users (walkers, birders, fishers, hobby farmers)	0	0	0	0	0	+	0	0	0	0	0	0	0
6	Moss farm fishery and café	0	0	0	+	0	+	0	0	0	0	0	0	0
7	Nearby Residents (not recreational users)	+	0	0	0	0	0	0	0	0	0	0	0	0
8	Residents from wider area	+	0	0	+	0	0	0	0	0	0	0	0	0
9	Local Schools (focus on primary)	0	0	0	0	0	0	0	0	0	0	0	0	0
10	"Global community"	0	+	0	0	0	0	0	0	0	0	0	0	0
CULTURAL SERVICES		Recreation and ecotourism	"non-use" values and spiritual values	Ethical and inspirat values	Educational and inspirat values									
1	Agricultural business (arable and silage livestock)	0	0	0	0									
2	Woodland / turf cutting business	0	0	0	0									
3	"Horsiculture" business	0	0	0	0									
4	Peat, sand, gravel extraction	0	0	0	0									
5	Recreational users (walkers, birders, fishers, hobby farmers)	+	0	0	0									
6	Moss farm fishery and café	0	0	0	0									
7	Nearby Residents (not recreational users)	0	+	0	0									
8	Residents from wider area	0	+	+	+									
9	Local Schools (focus on primary)	0	0	0	+									
10	"Global community"	0	0	0	0									

Figure 5: Logic chain: how is value generated through ecosystem services?



Provisioning services

Stakeholders gain value from the environment's direct provision of goods and services. They gain *utility* (satisfaction) from consumption of these goods which are provided freely, by the environment in combination with other forms of capital (human, financial, economic). The provisioning services listed in Figure 4 accrue to stakeholders located across the Mosslands and the wider area. In summary they include:

- Crops
- Livestock
- Aquaculture
- Wild foods
- Timber / other wood / Turf
- Extractive resource
- Biomass
- Freshwater.

Regulating services

Stakeholders gain value from the environment's indirect provision of regulating services. They gain *utility* from the services the environment provides for free. These predominantly relate to protection from environmental forces (flooding, other extreme weather), regulation of the environmental status quo or removal of pollutants. In summary they include:

- Air quality
- Global climate regulation
- Regional/local climate regulation
- Regulation of water timing/flows
- Water purification /waste treatment
- Disease mitigation
- Maintenance of soil quality
- Pest mitigation
- Pollination.

Cultural services

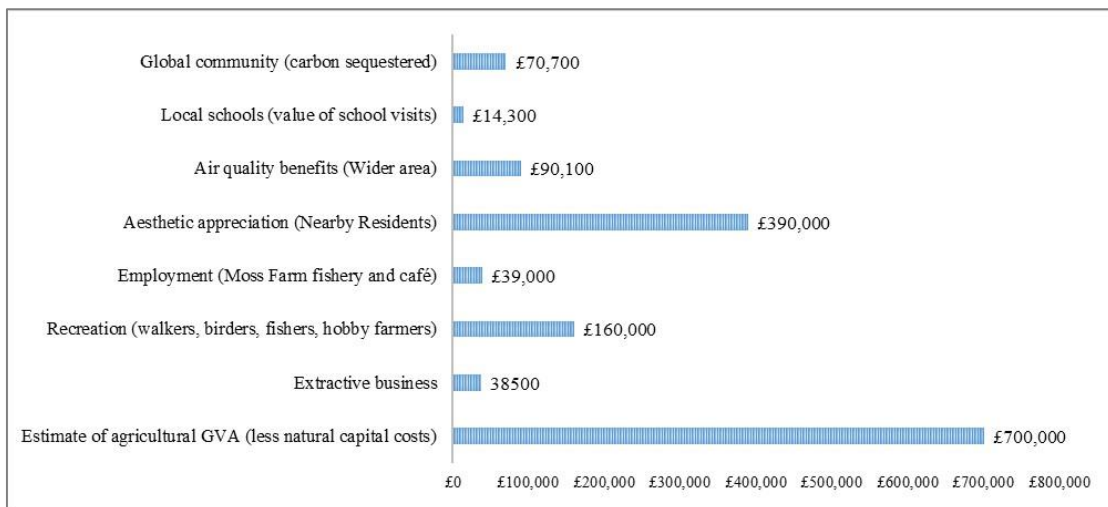
Stakeholders gain value from the environment's ability to create unique places for recreation, education and other *experiences*. Value is also attained through the connection with the environment. These are often less tangible than provisioning and regulating services. In summary they include:

- Recreation and ecotourism
- Ethical and spiritual values and "non-use"
- Education and inspirational values.

5.4 Per-annum estimates

To try and help illustrate the types of socio-economic value the Mosslands environment contributes to the local area, some estimates for the per annum benefits have been calculated. These are broken down on Table 5 below, and summarised in Figure 6. Attempts have been made within the constraints of the study, to relate these values back to ecosystem services, however this data is not always readily available and financial approximations have been used.

Figure 6: breakdown of estimated per annum benefits from the Mosslands



The estimated annual benefits from the site are estimated at approximately £1.5m per annum, or £545 per hectare per annum. This is intended to provide an estimate of the benefits (accounting for natural capital costs, where appropriate), using money as common measure of value.

The agricultural business benefits are pure economic benefits (Gross Value Added⁸) minus the natural capital costs (as a ratio of revenue, in this case applied to GVA) associated with farming practices in Western Europe. This is the largest benefit estimated, however this is deemed to be the fullest estimate.

⁸ Gross Value Added is a measure of the value of goods and services produced in an area, industry or sector of an economy, in economics. For this research, it was estimated using approximate number of agricultural workers and GVA per worker in the North West of England.

The value of the “aesthetic appreciation” is the second highest per annum value at nearly £400,000 per annum. This is based on the number of households adjacent to two wooded areas (Botany Bay Wood and New Moss Woods) taken from the ONS. The unit value is based on a study (cited in Holzinger, 2011¹⁵), who valued the willingness-to-pay for woodland views from home “urban fringe” in Great Britain, focussing on “views” and removing other benefits (e.g. recreation).

Recreation benefits are valued at £160,000 per annum based on a value of £3.20 per visit (based on an example focusing on “urban fringe woodland” recreational space) and 50,000 recreational users (this is discussed more in Section 5.5)

Air quality and carbon benefits are valued at £90,100 and £70,700 respectively. This is estimated using the woodland coverage within the Mosslands and per hectare estimates for removing particulates and carbon from the atmosphere and established £/tonne values from government.

The value of school visits was included, based on the value of a trip to a nature reserve and the number of schools in the area.

It was estimated that the café/fishery would support two FTE jobs. GVA per worker was used to estimate the contribution to the economy, to give £39,000.

Table 5: estimates of per annum costs and benefits by stakeholder

Stakeholders		Benefits	Costs	Net
1 & 2	Agricultural business & Turf cutting business	<ul style="list-style-type: none"> Estimate there are around 100 employees in agriculture (see Appendix B1) GVA per worker in the NW is approximately £35,000 per worker⁹ Estimate GVA: £3.5m per annum¹⁰ 	<ul style="list-style-type: none"> Agriculture typically places stresses on the environment resulting in natural capital costs¹¹. A cost/benefit ratio of 0.8¹² was used, to estimate the natural capital costs (relating to land and water only): £2,800,000. 	£700,000 pa
3	Peat, sand and gravel extraction business	<ul style="list-style-type: none"> Business activity and associated economic benefits Estimated that 11 jobs supported (see Table 3). GVA per worker in the NW is approximately £35,000 per worker⁹ 	<ul style="list-style-type: none"> Resource depletion / no future use Carbon emissions from activities on site Carbon released from peat extraction Amenity impact (noise, visual etc. temporary as long as works go on) 	£385,000 Note: Costs not quantified.
4	Recreational users: walkers, birders, fishers, hobby farmers	<ul style="list-style-type: none"> 50,000 estimated recreational users (see Table 3). 275 hectares of nature conservation and public enjoyment space (see Table 3). To arrive at a value, £3.20 per visit¹³ was used to give an estimated value of £160,000. 	<ul style="list-style-type: none"> Maintenance costs associated with recreation. 	£160,000 p/a Note: Costs not quantified.
5	Moss Farm fishery and cafe	<ul style="list-style-type: none"> Café employment estimate 1 FTE position; + Tackle shop / fishery employment; estimate 1 FTE position. GVA per worker in “accommodation and food service activities” was used: £19,500¹⁴ 	<ul style="list-style-type: none"> No costs identified 	£39,000 p/a
6	Nearby Residents (non-recreational users)	<ul style="list-style-type: none"> Property uplift (unquantified) Aesthetic appreciation has been valued. A study citing a Willingness to Pay value of 322.60 (2010) per household was used.¹⁵ Estimates of numbers of households near two wooded areas were taken, 1,200 were estimated.¹⁶ 	<ul style="list-style-type: none"> No costs identified 	£390,000 pa
7	Residents from wider Salford (non-recreational users)	<ul style="list-style-type: none"> Air quality benefits. Focus on the benefits from the 8% of 2,750 hectares which is woodland. Focus was on particulates: A rate of 0.009 t / ha / yr was used¹⁷ to estimate the removal of particulates from the atmosphere. A damage cost per tonne of £45,510 (low estimate)¹⁸ was used 	<ul style="list-style-type: none"> No costs identified 	£90,100 pa
8	Local schools (focus on primary)	<ul style="list-style-type: none"> Education benefits of visits. 22 schools have been identified in the local area. Assuming each school makes use of the Mosslands at least once per annum; use a value figure of £650¹⁹ (£ per trip per annum) 	<ul style="list-style-type: none"> No costs identified 	£14,300 pa
9	“Global community”	<ul style="list-style-type: none"> Focus on the benefits from the 8% of 2,750 hectares which is woodland Carbon sequestered per annum: 5.2 tonnes CO₂e per annum²⁰ Non-traded price of carbon (2015) £61.79²¹ £/tCO₂e 	No costs identified	£70,700 pa

⁹ 2011 figures from ONS: GVA for sector; £763m from 21,555 workers (income based)

¹⁰ Sense check: this equates to 0.4% of the North West’s agricultural GVA. The land area (2,750 hectares) equates to 0.3% of the North West’s total agricultural land area (909,000 hectares (ONS)). Therefore, the orders of magnitude seem to follow.

¹¹ Water pollution costs are dominated by the impact of eutrophication from phosphate and nitrate fertilizers. Land and water pollution impacts can be local in the form of polluted water sources which generate abatement costs and harm human health.

¹² This is the “Western Europe” cost-benefit ratio (specifically natural capital cost to revenue, focussing on land and water impacts) taken from the Natural Capital Coalition document *Natural Capital At Risk: The Top 100 Externalities Of Business*, available at: http://www.naturalcapitalcoalition.org/js/plugins/filemanager/files/Trucost_Nat_Cap_at_Risk_Final_Report_-_web.pdf

¹³ Sen and Bateman et al (2012): *Economic assessment of the recreational value of ecosystems in Great Britain*. Mean value of

¹⁴ Taken from ONS: <http://www.ons.gov.uk/ons/about-ONS/business-transparency/freedom-of-information/what-can-i-request/published-ad-hoc-data/econ/october-2015/gva-per-workforce-job-by-region-by-industry.xls>

¹⁵ Holzinger, O. 2011. *The Value of Green Infrastructure in Birmingham and the Black Country: The Total Economic Value of Ecosystem Services Provided by the Urban Green Infrastructure* (prepared for the Wildlife Trust for Birmingham and the Black Country).

¹⁶ ONS data for Lower Super Output Areas immediately adjacent to Botany Bay Wood and New Moss Wood.

¹⁷ Tiwary et al; *An integrated tool to assess the role of new planting in PM10 capture and the human health benefits: A case study in London*. Environmental Pollution, 157 (10). pp. 2645-2653. ISSN 0269-7491, available at: http://eprints.uwe.ac.uk/7603/1/Tiwary_et_al_2009_preprint.pdf

¹⁸ Air quality damage costs per tonne, 2015 prices: <https://www.gov.uk/guidance/air-quality-economic-analysis>

¹⁹ Mourato, S., Atkinson, G., Collins, M., Gibbons, S., MacKerron, G., Resende, G., 2010. Economic Assessment of Ecosystem Related UK Cultural Services. The Economics Team of the UK National Ecosystem Assessment, London School of Economics, London

²⁰ Natural England research reports; *Microeconomic Evidence for the Benefits of Investment in the Environment 2 (MEBIE2)* See: publications.naturalengland.org.uk/file/6198251661295616

²¹ From: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/360316/20141001_2014_DECC_HMT_Supplementary_Appraisal_Guidance.pdf

5.5 Annual values: under or over-estimate?

The value of £1.5m of benefits per annum is an aggregated illustration of the socio-economic contribution from the Mosslands to the local area. This has been done using desk-based data obtained from other studies and locations.

A number of the benefits included are catch-all estimates for complex environmental goods and services which could be disaggregated further with rigorous academic study. For agricultural business the calculation consists of gross value added by the sector, minus the natural capital costs to water and land (recognising that agriculture impacts on natural capital resources e.g. through use of fertilisers and pesticides, and impacts on soils etc.).

The agricultural sector still comes out as the highest contributor, however it is likely that many of the other socioeconomic considerations are missing. Further investigation could ascertain more accurate calculations of the specific costs and benefits. Other specific considerations in the above figures:

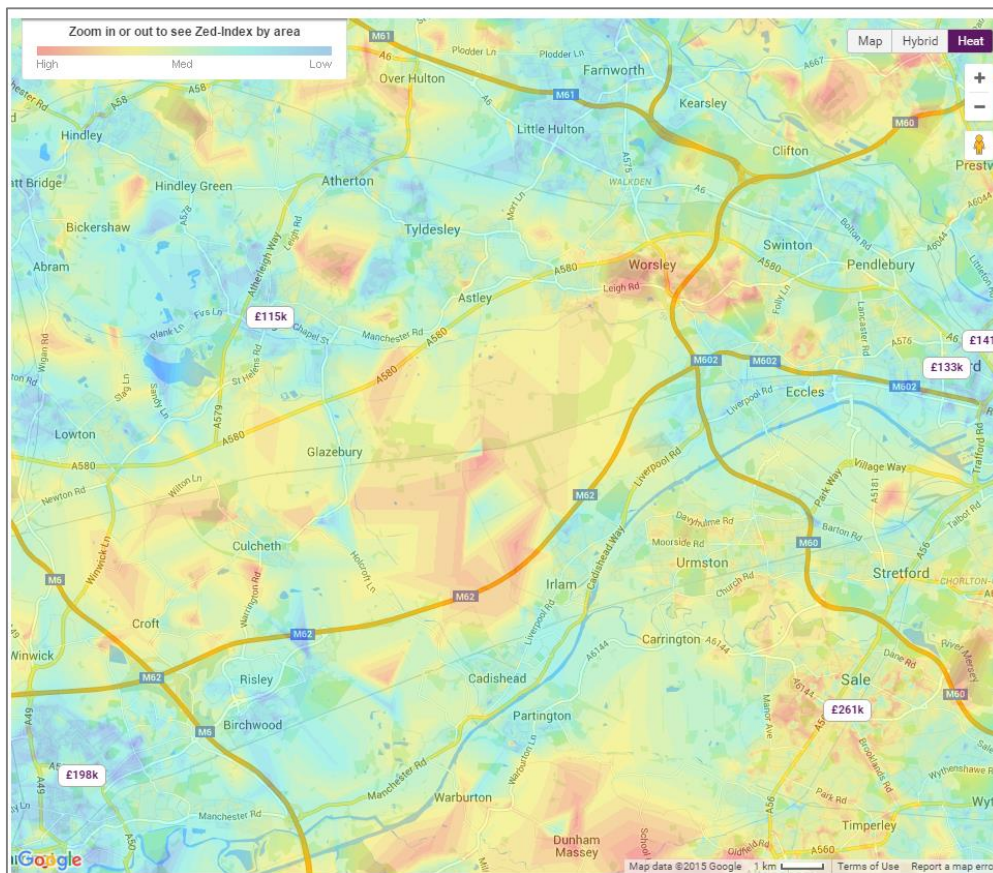
- The costs of resource depletion and carbon release from peat extraction have not been quantified. These costs are predominantly borne by future generations who cannot use the non-renewable resource, and suffer from the climate change potential of the released carbon. There is also the amenity impacts of the industrial process, which may inhibit recreational users.
- Trees may not be removing as many particulates as the calculation quoted. This will be dependent on the local atmospheric pollution levels. However, trees are known to remove other pollutants which were not included in the calculation.
- The number of recreational users is expected to be a significant under estimation. Consultation with the Moss Farm café alone reports 10,000 visits per annum, as such the Mosslands recreational users, estimated to be 50,000, is likely to be much higher.
- Furthermore, no attempt has been made to distinguish between different recreational users which may attach more or less than the £3.20 /person/visit that has been used in the calculation. Some studies quote much higher figures for certain types of recreational use (discussed more in Section 6.4).
- Impacts of recreational users (e.g. soil erosion/compaction, damage to vegetation, disturbance to wildlife, impacts of travel etc.), are also not quantified.
- The number of school visits estimated seems appropriate. LWT note that Little Woolden alone reported 383 people visiting the site as part of school trips. Using an approximate class size of 30, this equals ~12 trips. As such, our estimate of 22 for the wider Mosslands seems appropriate, if slightly under.

With such a large multi-functional environment, with so many interested parties, certain benefits may be over-estimated, others will be under-estimated and others may have been missed off. It is hoped that this valuation will generate debate amongst the stakeholders, which will lead to further investigation and refinement.

5.6 Other benefits

Certain goods and services have been excluded from the analysis as they do not necessarily align with the ecosystem service-led approach. The first is the affect the area has on property prices²². Below (Figure 7) is a property price heat map for the local area, which shows areas of higher prices throughout the Mosslands area. Part of this uplift will be associated with the surrounding environment in which the property is set. There will of course be many other factors at play (e.g. house type, access to schools, local crime statistics etc.).

Figure 7: Property price heat map (zoopla.com)



There will be other benefits associated with the environment. There will be health benefits which are not associated with air quality. Section 4.3 sets out how certain councils encourage “health walks” through the Mosslands area. This type of initiative will have numerous mental and physical health benefits, as well as the potential to reduce costs to the health service.

²² Best practice dictates that property is not a productive asset. This means that property price increases are not an economic benefit in themselves. Increases in property prices merely transfer wealth from those buying property to those selling it, and can lead to poorer members of society being priced out of neighbourhoods in greener areas. Therefore increasing property prices does not make sense as a goal of economic or social policy. Whilst the maximisation of property prices should not be the aim of future interventions, the influence of the area on property prices is likely to be significant.

The LWT places a high value on working with volunteers. As well as the direct benefits associated with the volunteer work itself²³, volunteering can have significant impacts on individuals and communities. These impacts, which have not been captured in the above analysis might include:

- Employability for people who may not have previously been employed. Volunteering can look good on a CV and increase soft-skills.
- Social integration and meeting new people for those who may be socially isolated.
- A sense of achievement and a positive impact on one's community.
- Learn new skills and get new interests/hobbies.
- May lead to employment which has an economic benefit (especially if someone is taken out of unemployment) as well as improving an individual's quality of life.

²³ LWT figures quote in two years the following works have been achieved: 35.8 hectares levelled; 58 ditch blocks; 6974m of new bunding created 500m bunding; 7770 ditch infill; 401m plastic piling; 3000 mossland plants planted; 400m of deadf hedging created; 22.1 hectares of birch removed; 3.38 hectares of bracken removed; 1496m of public footpath upgraded; 35m of post and rail created; 15 dipwells inserted; Four new wetland scrapes; 5.79m x 3.34m bird hide installed; A 10m x 4m poly tunnel erected.

6 Management scenarios

6.1 Introduction

This section examines the marginal effects of three environmental interventions. Three interventions are set out:

- Sinclair's Chat Moss restoration plan
- The alternative restoration plan, set out by LWT for Chat Moss
- The Carbon Trail, a wider Mosslands initiative.

The first two of the above scenarios focus solely on the Chat Moss site, whereas the third is a scheme which integrates the site with the wider area. The assessments are illustrative, and performed with the intension of demonstrating the difference in value creation between the options.

6.2 The Sinclair's Chat Moss restoration plan

The approach

The Sinclair's plan was a requirement of the planning permission. It is a basic/minimum approach consisting of some ditch blocking and rewetting. It does not include any water level management, and experience from the previous restoration at the southern end of the site has shown that rewetting without water level control ultimately leads to damage to internal bunds through wave action.

On the positive side, the open water has attracted a number of gulls and waterfowl, which have provided some extra variety and interest. It is not however what LWT would have wanted as they were looking for bog habitat.

The impact of the Sinclair's proposals will be broadly positive, in that the site will be wetter afterwards than it was before. However, the lack of water level management and any other management measures such as scrub removal means that the benefits will be limited and slow to take effect.

One negative impact may be that the public right of way which passes through the centre of the site will become more difficult to negotiate because of the wetter conditions.

Value creation

Stakeholder groups:

Recreational users (specifically birders and other wildlife enthusiasts) & nearby residents and wider Salford

LWT have stated that the most likely beneficiaries will be the bird watching community as there may be an increase in certain species. LWT has also stated that there may be some re-colonisation of ditches by water vole.

Affected ecosystem services:

- Recreation and ecotourism: increased variation in bird species may attract new bird watchers to the area who will benefit from seeing new species.
- Ethical and spiritual values and "non-use": linked to the re-colonisation of native species. Recreational users will gain.

No data was available on the existing levels of birdwatchers or other wildlife enthusiasts in this area. As such, calculating the marginal/incremental change as a result of these new species was not possible. One study²⁴ has showed that birdwatchers have a willingness to pay of £8.64 per visit.

Stakeholder group:

Moss farm fishery and café

Could see potential increase in trade from those working on the site.

Stakeholder group:

Global community

The plan, as it is described, is for a wetted but non-vegetated site. According to LWT, this is likely to release methane. This will have a negative effect on the global community stakeholder, through climate change impacts. This is expected to cease after approximately five years, when vegetation establishes itself.

6.3 Chat Moss restoration, LWT

The approach

The LWT plan would differ from the Sinclair's plan in several respects. Firstly it will seek to restore the site as an integrated whole, not just the bits where peat had been extracted. This will involve some careful planning, detailed surveys of peat depth and surface topography to enable the design of the final site contours to be agreed, including the location and shape of bunds, to retain water in the higher areas and to encourage rapid re-vegetation.

The Sinclair's plan does not include a strategy for engagement with the local community. Such a strategy could include a push for increased volunteering to help with work, or improve the access to the site for visitors, as the majority of the local community will be unaware of any changes and will not perceive any benefit. This is the approach LWT typically takes to site restoration, as illustrated below (example volunteer drive for Little Woolden Moss works).

²⁴ Christie, 2006 cited in O'Gorman and Bann, Valuing England's terrestrial ecosystem services, a report to Defra, 2008

Figure 8: volunteer recruitment from LWT website

Make new 'Friends' at Little Woolden Moss
Friday 29th January 2016



A 'Friends of Little Woolden Moss' group is being set up and we'd love locals to get involved and help shape the future of this recovering mossland.

Value creation

Stakeholder groups:

Recreational users (specifically birders and other wildlife enthusiasts)

Nearby residents and wider Salford

The same benefits as identified in the Sinclair's option are likely to accrue to this stakeholder group under this option. New species will make use of the newly restored sites. As the restoration seeks integration with other areas, there is arguably a greater likelihood of species establishment (which is not guaranteed under either option).

The volunteering drive has the potential to have a number of benefits such as those listed in section 5.6. Depending on where volunteer recruitment is targeted, volunteers could be drawn from a number of different stakeholder groups, such as recreational users, nearby residents/wider Salford, schools or local business.

As highlighted in section 3.6 of this report, there are perception and visibility problems with the site which are currently preventing it achieving its potential as a community asset. Initiatives such as volunteering associated with the LWT restoration could help improve visibility, and over time significantly increase the recreational use across the site which in turn could have a wide range of positive socio-economic impacts.

Stakeholder group:***Moss farm fishery and café***

Could see potential increase in trade from those working on the site. This could be more sustained than under the Sinclair's option, as people from the local area might be more likely to re-use the café in the future.

Stakeholder group:***Global community***

The faster rate of re-vegetation will ensure that few carbon emissions are emitted from the site.

6.4 Carbon Trail

The approach

The Carbon Trail is a project contained within the Carbon Landscape HLF programme. It will consist of a 20 mile cycling and walking trail from Wigan through the Mosslands and terminating at Risley Moss.

Every effort will be made to ensure that it integrates with other projects such as the Salford Greenway, improvements to canal towpaths, and the Irlam and Cadishead walking and cycle network.

LWT is keen to encourage this sort of integrated approach and it is equally likely that once the Mosslands became established as a desirable destination, similar facilities would spring up in the Irlam Cadishead area, especially with the active encouragement and possible financial support from the Hamilton Davies Trust.

There are other potential businesses (e.g. Peel) that are looking to create a major recreational development at Worsley Hall to the north east. One possibility is that this might include cycle hire facilities to encourage people out onto the Mosslands.

Value creation

Stakeholder groups:***Recreational users (specifically birders and other wildlife enthusiasts)******Nearby residents and wider Salford***

Of the three management options outlined, this is the most ambitious as it seeks to integrate the wider Mosslands area. The main impact (and the main driver) will be a substantial increase in the number of visitors visiting Chat Moss and other Mossland sites.

As stated earlier in this report (Section 1.5), value relates to people. As such, a substantial increase in people using the site, means more experiences and enjoyment of the site by people. By extension, the Mosslands area is therefore creating more socio-economic value by becoming more of a “destination” for local communities to enjoy. How this is broken down, and potentially valued

depends on the types of users. Table 6 shows the range of values by visitors to RSPB reserves.

Table 6: Value (£/person/trip) ranges for RSPB reserves²⁵

Type of visitor	Location	Value
Day visitors	South Stack	£13.61
	Frampton Marsh	£6.40
	Arne	£9.73
Holiday Makers	South Stack	£121.32
	Frampton Marsh	£108.50
	Arne	£133.00

Other studies²⁶ have shown that the willingness to pay of cyclists is £16.37 per visit, for horse riding the same study quote £15.53. With potentially thousands of additional users attracted to the site, it is easy to see how benefits could start to add up in the first few years.

²⁵ da Silva et al. 2014, Ecosystem services assessment at Steart Peninsula, Somerset, UK

²⁶ Christie, 2006 cited in O’Gorman and Bann, Valuing England’s terrestrial ecosystem services, a report to Defra, 2008

7 Recommendations

7.1 Further study and refinement

The premise of this research has been that the Mosslands create benefits for certain stakeholders. In many cases there would be no value created without the natural capital asset, but equally, no end value could be realised without human creativity, investment or time.

Further study could focus on certain areas where knowledge is low or non-existent, across everything highlighted in this report, with the intention of providing a more accurate quantitative understanding. Should any further research proceed, a multidisciplinary approach should be taken, utilizing environmental, economic and ecology expertise, as well as those with local knowledge. Specific research might seek to unpack how many jobs are connected to (or associated with) specific environmental services, or the health impacts, and impacts on health spending, associated with the recreational use of the site.

The figures included in the evaluation are intended as a first step in describing the value created. Further study should review, reject and/or refine these approximations to seek further understanding. This should include rigorous assessment of the data sources, and appropriate adjustments to account for the following factors:

- Attribution and leakage – what proportion of final benefit is attributable to the moss, how much is attributable to other inputs, how much of the final benefit “leaks” out of the study area.
- Confidence in the data source – data needs to be thoroughly appraised in terms of reliability, and suitable adjustments made.
- Inflation – the data need to be adjusted to account for inflation.
- Socio-economic adjustments – where data has been transferred from one study area to another, this will need to be adjusted to make it suitable for the socio-economic conditions.

If it is considered appropriate to carry out more detailed research or analysis, there may need to be targeted primary data gathering designed and carried out by specialist organisations with experience in this area.

7.2 Recommendations

Take a Total Economic Value approach to investment and management

The Mosslands area is arguably not achieving its potential in terms of its socio-economic value. This potential could be realised with appropriate management and investment. This could, in turn, create an asset for Greater Manchester which is similar in scale and usage to the large parks of London. This could also go some way to addressing persistent socio-economic problems in/around the area, but also create new benefits.

Investment and management should attempt to maximise as many benefits as possible. This should be driven by a Total Economic Value approach which considers all stakeholders and value-types.

Strategic management role

If a strategic *Total Economic Value* view used in future decisions, there is a need for strategic governance i.e. a body or individual responsible for considering the total economic value of the Mosslands area. Such a body or individual should be charged with attempting to represent the viewpoints of all stakeholders who derive value from the river.

Always consider intrinsic value

The Mosslands environment, the habitats and the wildlife have an intrinsic value, which is not necessarily linked to the socio-economic values discussed throughout this report. Any future studies or interventions which focus on value, should have regard for the Mosslands' intrinsic value, to ensure economics does not over-ride biodiversity in its own right (i.e. not just for human enjoyment).

Data collection

When considering future investment and management options, approaches for data collection should be explored, to help inform future plans. This might look at:

- Visitor numbers and location.
- Visitor types: walker, cycling, birders, organised groups etc.
- Travel data: where have visitors come from? How have they travelled?
- Stakeholder valuation research. What is the willingness to pay (WTP) of different groups (would require specialist surveyors).

Site specific projects

There is a lot of potential for changes at the “project scale” which can maximise value for certain stakeholders. These could link to the GM Priority ecosystem services discussed in Section 5.2 of this report. Specifically:

- Increase the cross linkages with existing network of green recreational/active travel routes, including river valleys, canals and National Cycle Network
- Shift to food production (although, if done at a larger scale this might conflict with other ES).
- Increase retrofitting of green infrastructure / landform to provide water storage/infiltration.
- Need to preserve and enhance our existing peat.
- Work with private and public landowners to reverse habitat decline and actively manage to connect up our ecological networks.

Appendix A

Background research

A1.1 Millennium Ecosystem Assessment

The MEA study is focused heavily around the actual state of the global ecosystems and the services they supply. Much of the content is high level, and contains a call to Governments to correct policy in a number of areas. In terms of practical messages for improving the management of land, the MEA stresses the need for economic incentives to correct environmental degradation, improving the voice of affected stakeholders, improved understanding of ES and improved efficiency in ES consumption to halt degradation.

The MEA framework defines four types of ES; provisioning, regulating, supporting and cultural. These were defined as follows:

- Provisioning services - the resources or ‘goods’ obtained from nature
- Regulating services - the beneficial processes like water-purification and disturbance prevention
- Cultural services - the ‘non-material benefits people obtain from ecosystems through spiritual enrichment, cognitive development, reflection, recreation and aesthetic experience’
- Supporting services - essential ‘pre-conditions’ for all other ecosystem services (e.g. habitat provision and nutrient cycling).

The MEA framework does not distinguish clearly between intermediate and final benefits. This is an important distinction in ES assessments as intermediate services contribute to final services.

A1.2 The Economics of Ecosystems and Biodiversity (TEEB)

The TEEB initiative was launched in response to the G8+5 meeting in Potsdam (2007). At the meeting there was a proposal to develop a global study on the economics of biodiversity loss. The resulting TEEB framework, like the MEA, is an international study which builds on the work done in the MEA. The TEEB framework attempted to try to aid articulation of the ecological and economic aspects of an ecosystem necessary for the valuation of biodiversity loss and ecosystem degradation. The distinction drawn between intermediate and final services is the main difference between TEEB and MEA.

A1.3 UK National Ecosystem Assessment

Following on from the two global studies outlined above, the UKNEA was the first analysis of the UK’s natural environment in terms of the benefits it provides to society and continuing economic prosperity. Its findings underpinned many of the recommendations in the Natural Environment White Paper (discussed in section 3). The MEA and TEEB findings underpin the UKNEA’s methodology and conceptual framework. Like TEEB, the UKNEA makes a clear distinction

between final ES and the intermediate ES and/or processes to allow for final ES valuation and avoidance of double-counting.

A1.4 Limitation with an ES approach

Whilst the ES approach is relatively well known in academia, its application beyond this area is relatively new, but growing. This brings with it problems, as, in some instances the research and data has not caught up with the eagerness to implement the approach. This has resulted in a great deal of studies using the benefit transfer approach for cost saving purposes. This means primary data is not always sought and often data recirculates between assessments without being properly refined. This is less of an issue if the results of the work are used for high level assessments and not for major policy decisions.

Other drawbacks with the approach include:

- The ES approach does not take into account the intrinsic value of nature – nature’s value for nature’s sake. This can be antagonistic to certain policy aims and objectives.
- At the valuation stage the work can become extremely technical, when seeking to design willingness to pay (WTP) surveys, or handle large quantities of environmental and economic data.
- Benefit transfer can require detailed economic data for local areas which may not be readily available, and applying this approach without local adjustments can render the data and results meaningless. Further to this, data and valuation functions may be difficult to obtain from the original researchers.
- The use of discounting in environmental economics is controversial, as it is often said to give a preference to current generations, over future generations.

There will always be uncertainty and assumptions in any assessment. For this reason perspective and purpose should be key drivers when deciding on the acceptable level of uncertainty for an appraisal. What is the purpose of the assessment? What will the outputs be used for? These types of questions should drive the level of accuracy required and the level of detail put in, particularly if valuation is taking place. This echoed by the Green Book which states:

it is important to avoid being spuriously accurate when concluding from, and presenting the results of, data generated by the appraisal. However, the confidence in the data provided by the analysis will need to increase, depending on the importance or scale of the decision at hand (for instance, depending on how much resource will be committed by the decision)

To resolve these types of criticisms, all valuation **assessments should be transparent in the data sources and any assumptions used**. This will allow assessments and the findings to be scrutinised and tested in terms of their sensitivity (to, say, the tonnage value of carbon saved).

Figure 9: "Spot the ecosystem services" adapted from DEFRA Natural Environment White Paper²⁷



²⁷ For pdf version see <http://www.official-documents.gov.uk/document/cm80/8082/8082.pdf>

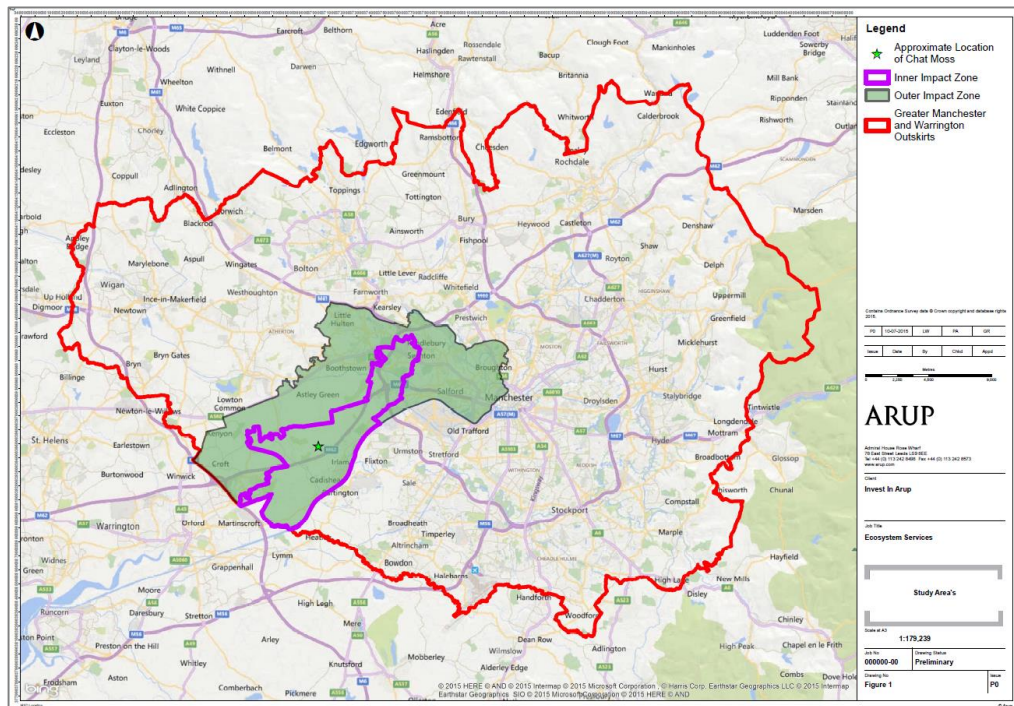
Appendix B

Socio-economic baseline

B1 Socio-economics

Desk based research was carried out to illustrate the socio-economic trends in the area in and around the Mosslands. Three comparator areas were defined for the socio-economic research using Middle Super Output Areas. These are shown on Figure 10.

Figure 10: Research areas for the Mosslands research



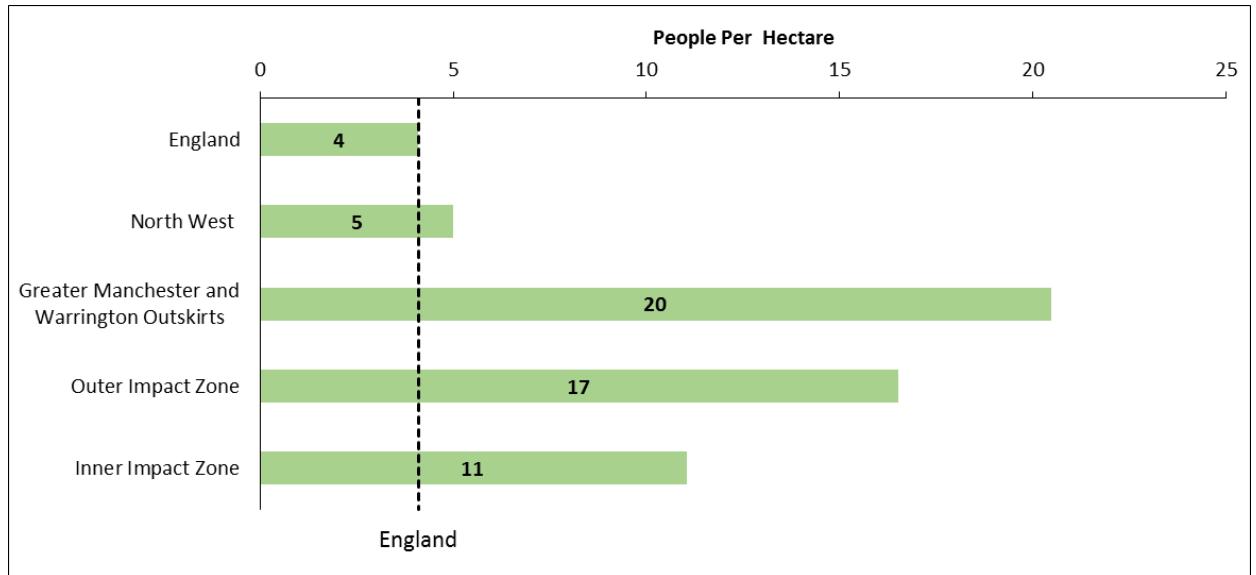
The wider area shown in red is Greater Manchester, within that is the “outer impact zone” comprises of the administrative boundary of Salford and the MSOA of Warrington 01, 02, 04 and 05 alongside Wigan 29. The “Inner Impact Zone” (IIZ) comprises of the Middle Super Output Areas (MSOA) of Salford 09, 14, 19, 25, 29 and 30 as well as Warrington 02 and 05.

Population

Salford has an approximate population of nearly a quarter of a million²⁸, and Greater Manchester 2.7 million people. The population is not evenly distributed, Figure 11 illustrates the population density for different comparator areas. The IIZ, OIZ and Greater Manchester and Warrington Outskirts all have significantly higher population densities in comparison to those observed across the other comparator areas of the North West and England.

²⁸ ONS. Population and population density data set. QS102EW 2011 census data.

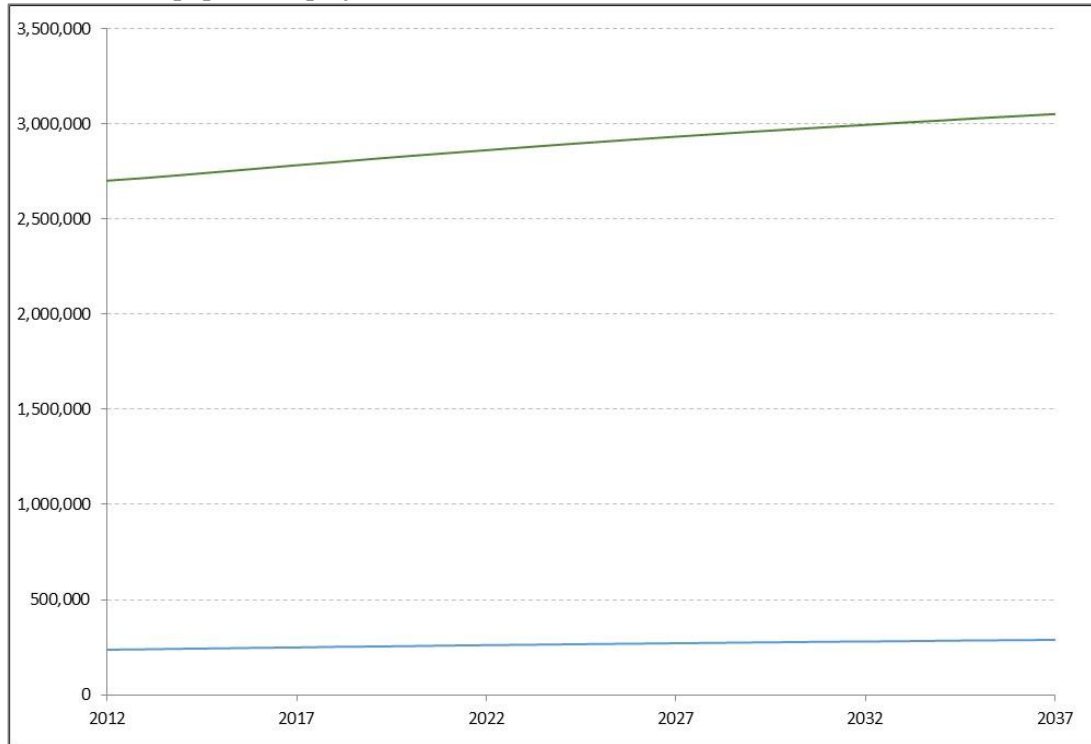
Figure 11: Population density for varying comparator areas (Source: ONS, 2011 census data)



Across the GM/Warrington outskirts, OIZ and IIZ there is a falling population density, however, all three are significantly more densely populated than England and the wider North West.

Figure 12 shows predicted population change for Salford and Greater Manchester. A steady increase in the population is expected for all future years.

Figure 12: Predicted population change within Salford (blue), Greater Manchester green) (source: ONS population projections)



Economy

Figure 13 displays the economic activity for the given comparator areas²⁹. Overall the comparator areas are comparable with no significant differences between the categories. The IIZ has a marginally higher proportion of those in full time work at 42.4 %.

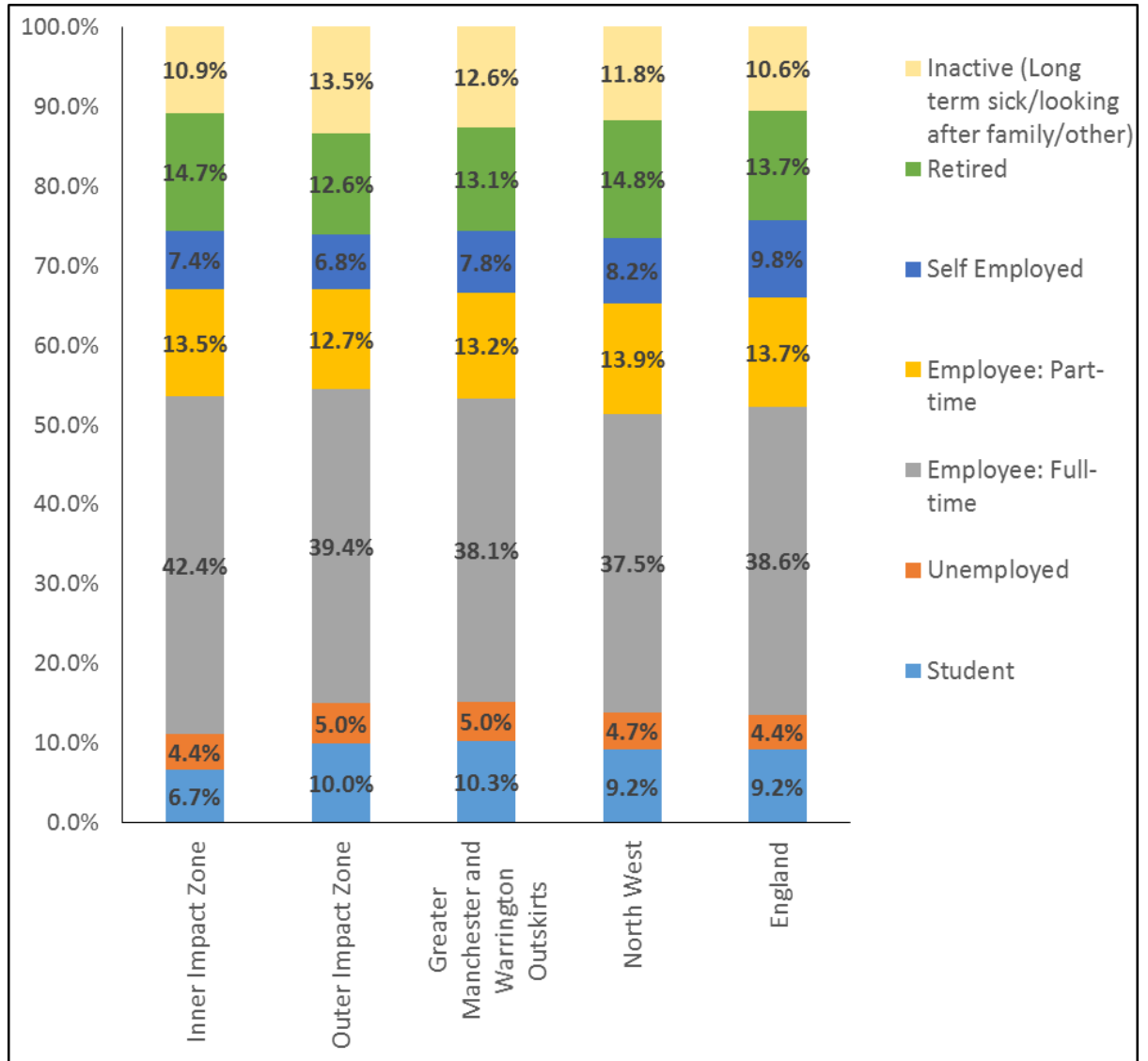
The IIZ and England have a comparable 10.9% and 10.6% inactive population, which, lower than other comparator areas. The OIZ has the highest (13.5%), and GM/Warrington outskirts has the second highest of those in the population who are economically inactive.

Unemployment is lowest in the IIZ and England. GM/Warrington outskirts and the OIZ have the highest proportion of those who are unemployed.

The IIZ has one of the highest proportions of the population who are retired, whereas GM/Warrington outskirts and the OIZ have the two lowest proportions.

²⁹ ONS. Economic activity. QS601EW census data.

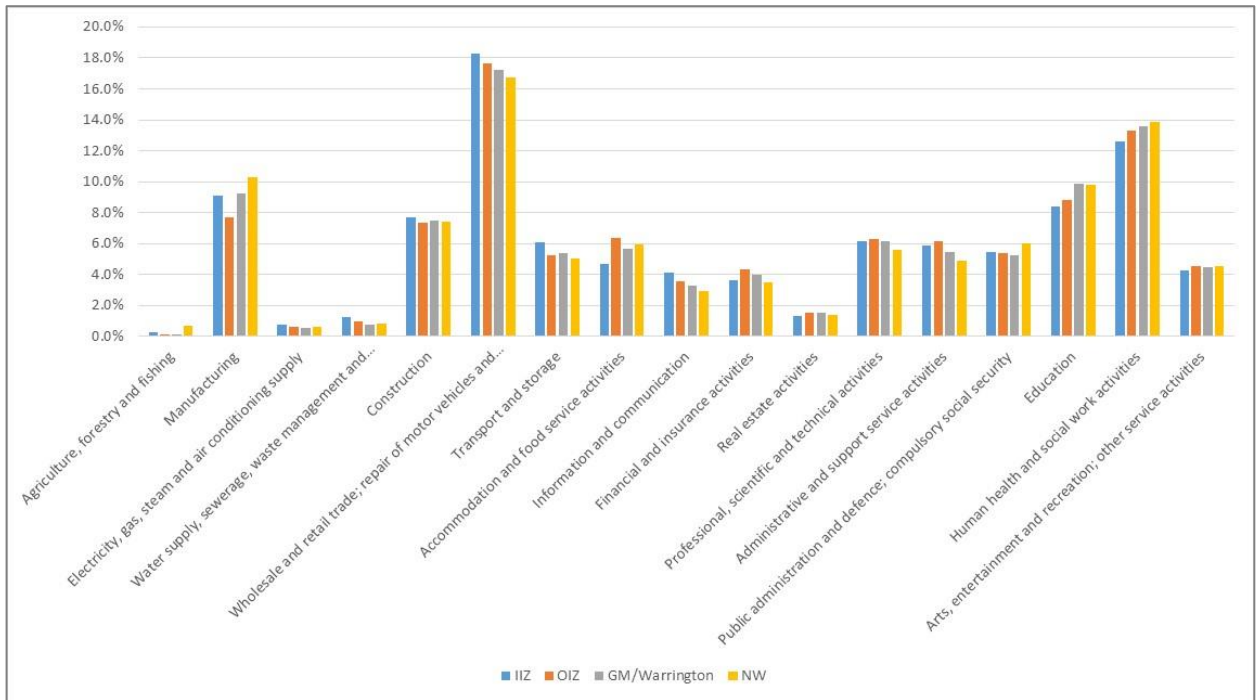
Figure 13: Economic activity of comparator areas (Source: ONS)



Employment by industry

Figure 14 shows the employment profile for four comparator areas.

Figure 14: Relative proportions of employment by industry (Source: ONS)



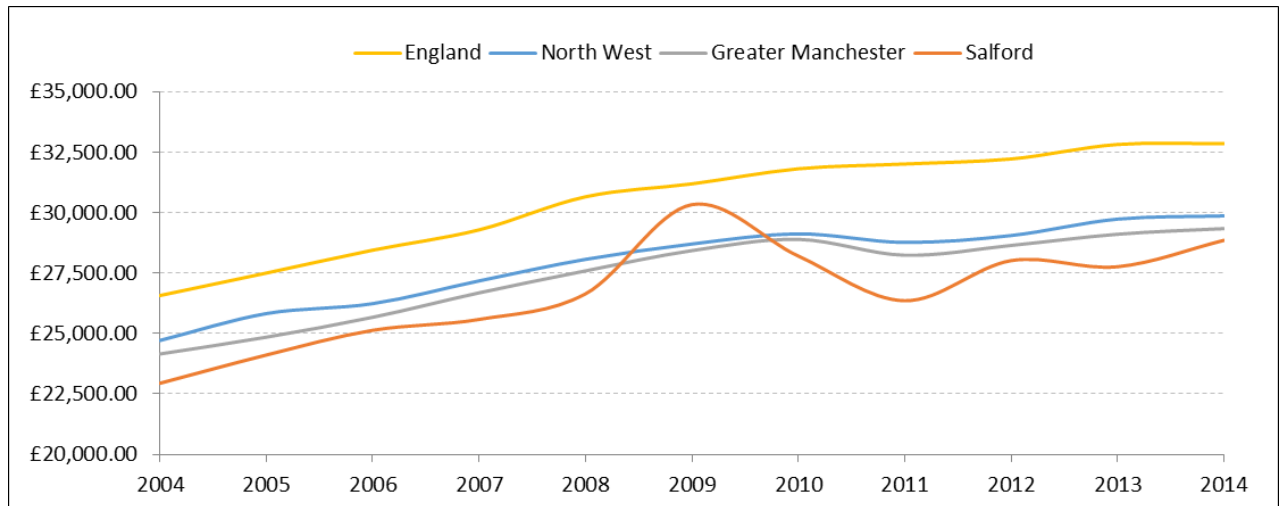
Income

Figure 15 shows trends in mean annual income for full time workers across 4 comparator areas. The mean annual income per full time worker³⁰ in Salford has seen an increase from £22,945 in 2004 to £28,856 in 2014. The mean income level for Salford is generally lower than the wider Greater Manchester and North West regions (the exception of 2009 when Salford has a higher average wage).

The income level for Salford, Greater Manchester and the North West is lower than the average full time income across England. The mean income across Salford is on average just over £5,000 less than that of the national average with income in 2014 £5,359 less and a peak differential of £7,167 noted in 2011 (Figure 15).

³⁰ ONS. Annual hours and earnings. Annual hours and earnings census data.

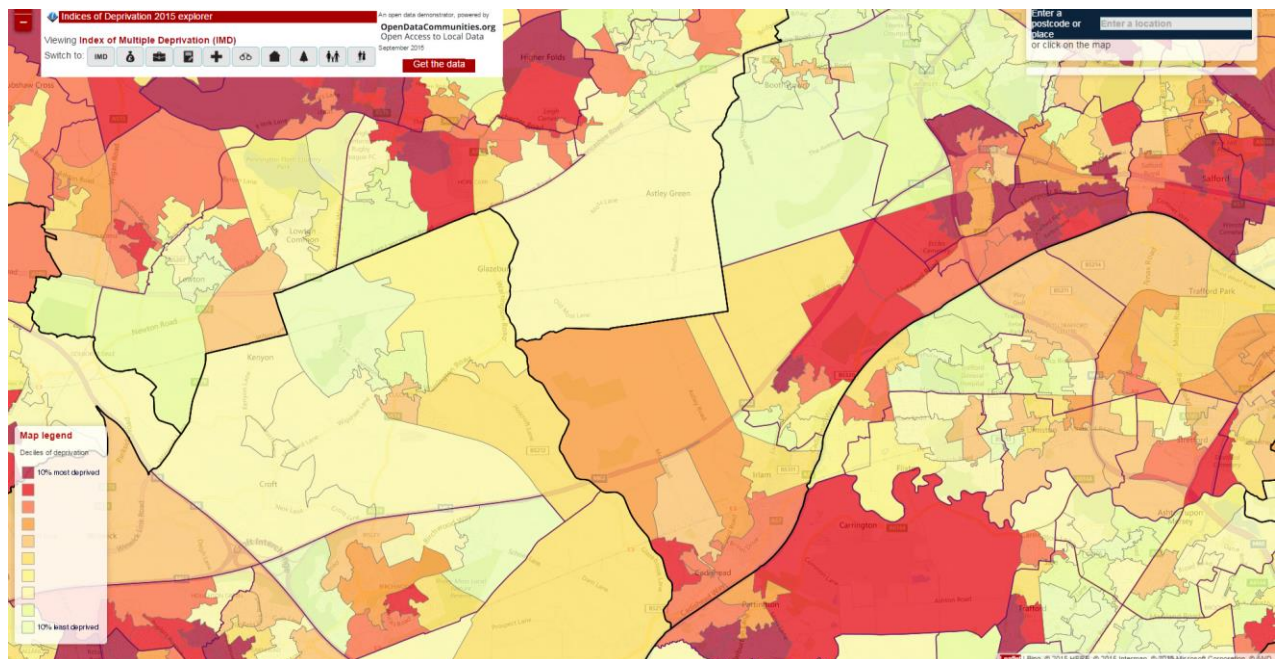
Figure 15: Mean annual income for full time employees across comparator areas (Source: ONS, 2011 census data)



Deprivation

The Indices of Multiple Deprivation (IMD) is a multivariate indicator set produced by government to aid and inform awareness of deprivation and approached to improving the conditions in deprived areas. It examines many contributing factors to deprivation and weights them into one index. Figure 16 deprivation across the Mosslands area.

Figure 16: IMD rank mapping (Image from <http://opendatacommunities.org>)



What is shown, is an area of contrasting levels of deprivation. Pockets of significant deprivation exist north of Irlam, and towards Eccles, but these exist in close proximity to significantly less deprived areas around Urmston and Davyhulme.

Figure 17 shows the “living environment” deprivation domain. The Living Environment domain combines 4 indicators to give an overall score for the level of deprivation in the quality of the local environment³¹. Similar patterns to the IMD. Certain areas which are considered deprived in the IMD measure, are considered less deprived in terms of the living environment.

Figure 17: Living environment deprivation domain (Image from <http://opendatacommunities.org>)

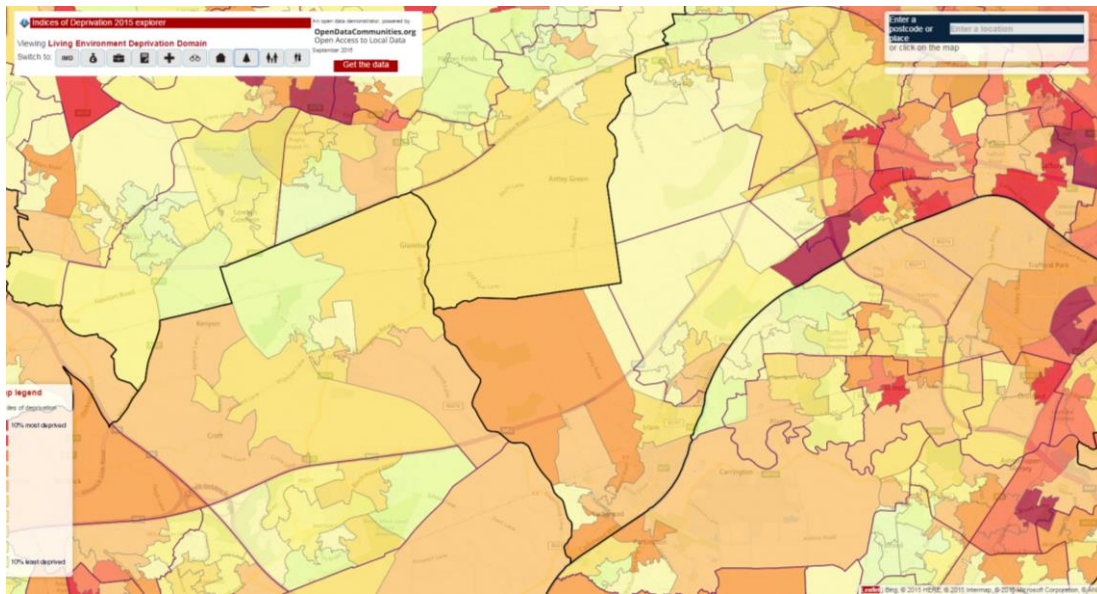
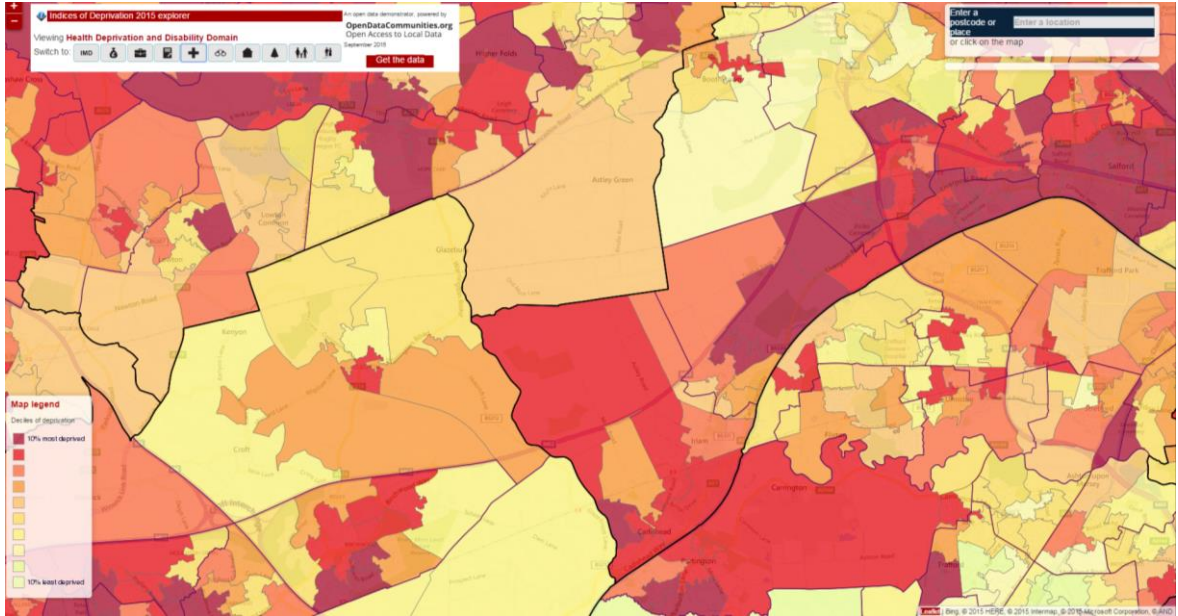


Figure 18 shows the “health and disability” deprivation domain. This includes data for early deaths, comparative rates of illness, morbidity and mood/anxiety disorders. What is clearly shown, is that health and disability is a significant issue in the area, with more areas of red (i.e. more deprived) across the wider area, even in those which are not considered more deprived in the above figures.

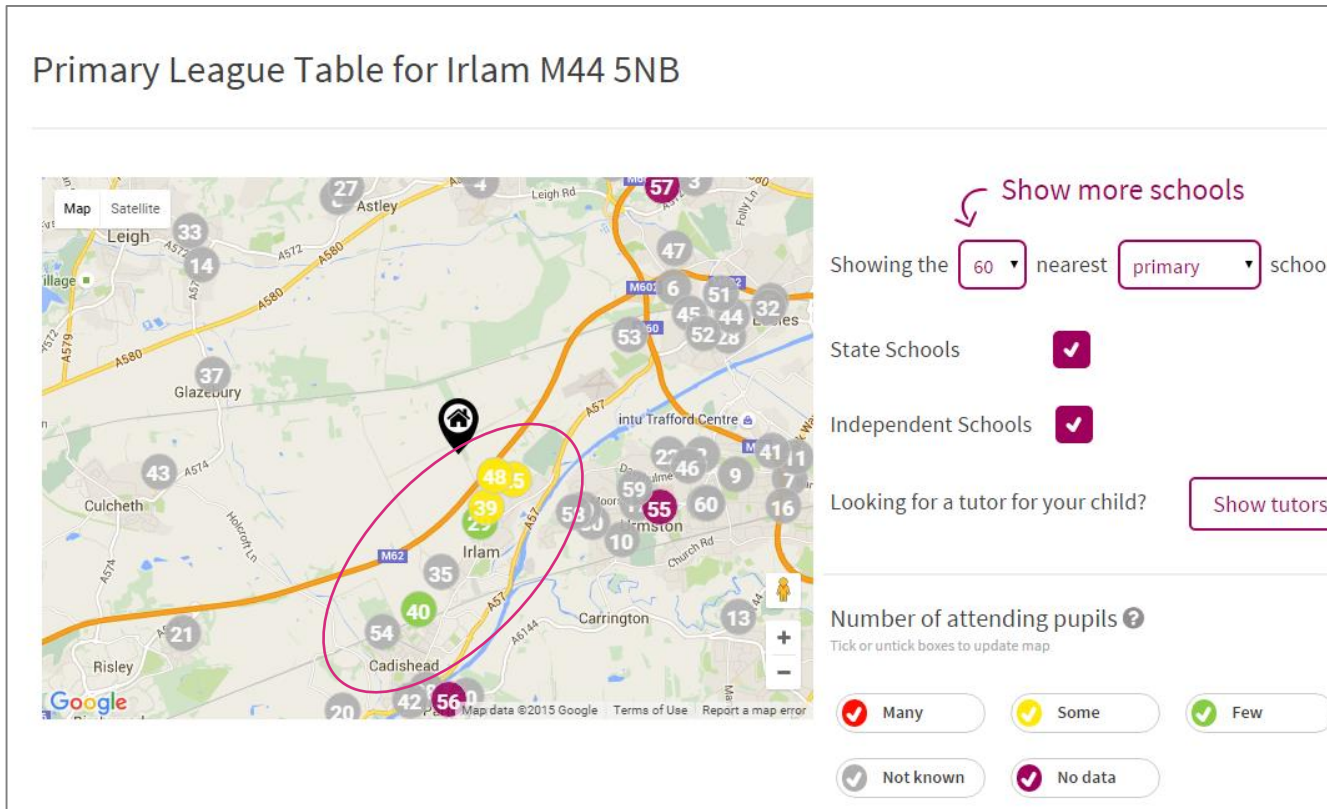
³¹ The indicators used in the latest update of this domain are; - Social and private housing in poor condition - Houses without central heating - Air quality - Road traffic accidents involving injury to pedestrians and cyclists

Figure 18: Health and disability deprivation domain (Image from <http://opendatacommunities.org>)



Local primary schools: Near Chat Moss

Source: www.schoolguide.co.uk



Focus on Irlam and Cadishead Schools. Seven schools with:

- 54: St Mary's CofE Primary School, 201 pupils
- 48: Moorfield Community Primary School, 157 pupils
- 40: Cadishead Primary School, 390 pupils
- 39: Irlam Endowed Primary School, 244 pupils
- 35: St Teresa's RC Primary School, 259 pupils
- 29: Irlam Primary School, 405 pupils
- 25: Fiddlers Lane Community Primary School, 222 pupils
- **Total local pupils: 1,878 (average for each school: 268)**
-

Local Primary schools: Around the Mosslands (approximation)

An approximation of the numbers of school children was undertaken, using the average number of school children per school in Section 0, multiplied by the number of schools on the periphery of the Mosslands area, shown below (using www.schoolguide.co.uk).

- Number of schools identified: 22
- Average from Chat Moss: 268
- **Total local pupils: 5,896**

